

LONGITUDINAL SURVEYS OF AUSTRALIAN YOUTH  
RESEARCH REPORT 65

## Educational outcomes: the impact of aspirations and the role of student background characteristics

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# About the research

## *Educational outcomes: the impact of aspirations and the role of student background characteristics*

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Current educational reforms and targets, such as increasing higher-level qualifications amongst the working-age population, are reliant on improving the educational outcomes of people from disadvantaged backgrounds. This paper follows on from previous research, which has shown that educational aspirations are strong predictors of educational outcomes, including Year 12 and tertiary participation. The focus of the paper is to understand the relationships between student background characteristics, educational aspirations and educational outcomes.

The researchers set out to determine whether student background factors, such as socioeconomic status (SES) and Indigenous status, only affect educational outcomes via their indirect effect on educational aspirations. They also examine whether aspirations have the same effect on educational outcomes for young people from disadvantaged backgrounds as those who are not from disadvantaged backgrounds. The analysis is based on data from the Longitudinal Surveys of Australian Youth (LSAY), which collects information on aspirations at age 15 years via questions on intentions to complete Year 12 and post-school study plans.

## Key messages

- Educational aspirations have a substantial effect on educational outcomes.
  - Individuals who plan to complete Year 12 are 20–25% more likely to do so, compared with those who do not intend to complete Year 12.
  - Individuals who intend to go onto university are 15–20% more likely to do so, compared with those who do not have post-school university plans.
- Interactions between educational aspirations and student background characteristics do not seem particularly important, suggesting that aspirations have a similar impact on educational outcomes, regardless of socioeconomic status and Indigenous status.
- There were some significant interactions between aspirations and academic performance. For example, those who considered their academic performance to be average or below average, relative to their peers, were less likely to achieve their aspirations compared with those who considered their performance to be above average.

The authors conclude that interventions to lift the aspirations of young people should have a similar impact for all young people, including those most at risk of poor educational outcomes.

Rod Camm  
Managing Director, NCVET



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# Executive summary

The paper studies the relationship between educational aspirations and their realisation. The results presented here confirm those of other studies: that aspirations have a substantial effect on educational outcomes.

However, it also appears that the method of analysis matters. Once we take into account the possibility that the unobserved components of aspirations and their realisation may be correlated, the real effect of aspirations on outcomes appears to be around one-half of that measured by approaches that ignore any such correlation. The correlation between aspirations and realisations may arise because factors such as motivation, perseverance, ambition, ability or beliefs about the value of education may affect both phenomena.

The data studied here are from the Y03 and Y06 cohorts of the Longitudinal Surveys of Australian Youth (LSAY). We use information on the educational aspirations of individuals when they were aged 15 years and compare them with their later educational outcomes. The results are consistent with an effect typically reflecting the aspirations of a 15-year-old on the probability of Year 12 completion being in the range of 20 to 25 percentage points, and of the effect of intending to study at university on actually doing so of the order of 15 to 20 percentage points. These are large effects, much larger than the effects of school achievement or family background on these outcomes.

In general, these aspirations tend to have a similar impact on outcomes across individuals, regardless of their demographic background. That is, interaction effects between aspirations and the demographic characteristics do not seem particularly important.

There are, however, significant interactions between aspirations and real and relative academic performance, which suggests that high-achieving individuals are more likely to realise their aspirations. Furthermore, those who considered their performance to be average or below average were less likely to realise their aspirations than those who considered their performance to be well above average.

This study does not focus explicitly on how aspirations are determined or how effective alternative policies might be in changing the aspirations of individuals. Essentially, however, the results of this study push the emphasis back onto the processes that shape the aspirations of young people, since it found that these do determine young people's (educational) futures and translate into outcomes in a similar way across individuals, regardless of their social background.

The results suggest that if it is possible through policy or the programs of schools or community organisations to change the aspirations of individuals, such changes in aspirations should translate uniformly across all individuals into increased educational outcomes. Interventions, for example, that increase the educational aspirations of Indigenous youth and young people from low socioeconomic status (SES) backgrounds might have the same impact on their outcomes as those changing the aspirations of people from other parts of the social welfare distribution.

# Introduction

Educational aspirations (in this study, planning to remain at school until Year 12 or planning to participate in university) at age 15 years are strong predictors of young people actually achieving these outcomes. One study using data from the Longitudinal Surveys of Australian Youth found that aspirations were the primary means through which family background variables such as socioeconomic status (based on parental occupations and parental education) influenced actual realisations. While school achievement had a direct effect on realisations of school completion and university participation, the family background factors influenced realisations only indirectly through their effect on aspirations (Khoo & Ainley 2005).

Three research questions are addressed in this report. First, in more recent data, do background factors affect realisations only via their impact on aspirations? Second, do aspirations have the same effect for young people from disadvantaged backgrounds as others on the realisations of their outcomes? Further, can high aspirations overcome entirely the impact on outcomes of being from a disadvantaged background?

The problem for the analysis of the first question is that the impact of educational plans or aspirations on realisations may be very difficult to measure. This arises because the unobserved characteristics of individuals such as motivation, perseverance, ambition, ability or beliefs about the value of education may affect both educational aspirations and realisations, such that aspirations may be highly correlated with the models where the dependent variable is an educational outcome. The consequence of this problem (known as an ‘endogeneity’ problem) will be to bias up the aspirations parameter, and bias down the parameters on the observed background variables. Hence, we endeavour to assess in our empirical analysis how important such a correlation might be and the extent of its impact on the estimated results. We adopt four approaches to assess the potential bias in the aspirations parameter in the realisation equation: estimation using simulated data; instrumental variables; imposing plausible correlation patterns on the results; and including variables likely to be correlated with motivation and education preferences. While the simulation results confirm that we might well be concerned about the potential problems associated with even moderate levels of correlation, the other results suggest that the problems do not negate the view that aspirations have a substantial impact on educational outcomes.

In this paper, with data from the Y03 and Y06 LSAY cohorts, we find that family background factors have both direct and indirect effects on realisations, even after controlling for reading/mathematics performance at age 15. Further, the effects of aspirations on realisations are large. *Planning to complete Year 12* increases the probability of actually doing so by 20 to 25 percentage points, while *planning to undertake university studies* increases the probability of doing so by around 15 to 20 percentage points. The magnitudes of the estimated effects for the Y06 cohort appear to be broadly consistent with those of the Y03 cohort.

In general, we find that the impact of aspirations on realisations does not differ according to the social background or demographic characteristics of individuals. While there were a few cases where the interactions were significant, most were related to measured school achievement or perceived performance relative to peers. In general, there were no consistent interactions between aspirations and socioeconomic status or other background characteristics. The conclusion is that aspirations tend to have a similar impact on realisations, regardless of the demographic background of individuals. Therefore, they cannot act to counteract problems associated with disadvantage. On the other hand,

their impact is not diluted by disadvantage either. Planning to undertake some level of education has the same large impact on actually doing so for a young person from the top of the social background distribution, as it does for a young person from the bottom.

The remainder of the paper is organised in the following way. The next section contains a summary of the literature on the roles of disadvantage and aspirations on educational outcomes. The following section contains a description of the data and the methodological approaches adopted here. The results are presented in the subsequent section and the conclusions follow in the last section.

# Disadvantage and educational attainment: review of literature

There are two important strands of literature of relevance for this study. The first relates to the measurement of disadvantage. The second relates to the determinants of educational attainment, notably here, the completion of the highest level of schooling or university participation and the role of disadvantage and expectations or aspirations in these decisions.

## Approaches to describing disadvantage

Many of the early studies on disadvantage among groups in society took a uni-dimensional approach to its extent and consequences. In economics, its analysis has often focused on a lack of material resources, typically captured through some measure of income. More recently, studies applying a uni-dimensional approach to disadvantage have been criticised for their failure to fully capture the concept. According to Sen, the perspective on poverty as the lack of the capabilities to live a minimally decent life makes it ‘inescapably multidimensional, since there are distinct capabilities and functionings that we have reason to value’ (Sen 2000). In addition, it has been suggested that any uni-dimensional approach to disadvantage, including those captured by income, are not informative of the reasons behind poverty, thus limiting the space for policy interventions (Headey 2006). On the other hand, multidimensional approaches may be helpful in offering a framework to focus on the institutions and actors involved in the processes that cause deprivation (De Haan & Maxwell 1998).

Motivated by the above considerations, a multidimensional approach to disadvantage has been increasingly applied in more recent studies. The paper by McLachlan, Gilfillan and Gordon (2013) reflects this development, while also emphasising that persistence is a defining feature of deep disadvantage. Since the consequences of different forms of disadvantage may vary at different points of the life cycle, some studies have focused on analysing it within different age groups. Specifically, studies on youth disadvantage have applied tailored approaches to capturing it. The United Kingdom Government’s Opportunity for All section on children and the New Policy Institute’s Monitoring Poverty and Social Exclusion series both cover family economic circumstances, including indicators of low income and workless households, to capture household deprivation. In addition, studies that focus on children’s own outcomes point to their further deprivation as adults. Accordingly, these studies include measures of health and wellbeing and the education and safety environments, including indicators of teen pregnancy, non-attendance of school or low attainment, and engagement in risky or anti-social activities.

A common way to measure whether individuals’ experiences of multiple disadvantages early in life has consequences for their later life outcomes involves regressing the later life outcomes on the individual disadvantage measures and interactions between the measures (or allowing the count of the number of disadvantages an individual faced to have a non-linear impact on the outcome of interest). In this framework, having multiple disadvantages has consequences if some joint effect from the interaction of two or more disadvantages leads to worse outcomes for an individual than the sum of the individual effects would imply (Berthoud 2003). Berthoud (2003) finds that educational disadvantage is one of the factors associated with later joblessness, including additional effects when experienced in conjunction with other forms of disadvantage.

Such an approach does not really suit the application in this paper, since the main measure of disadvantage used here reflects parental socioeconomic status, as captured in an occupational status scale. Since we found no evidence that this interacted with any other demographic characteristics, we did not pursue the notion of multiple disadvantage further in this paper, other than give some attention to assessing whether patterns of disadvantage were worse among the Indigenous population. In general they were, but we did not find evidence of interaction effects, for example, that being from an Indigenous background made any low socioeconomic status effect worse than if the individual had been from a non-Indigenous background.

## Disadvantage and educational attainment

In a review of literature on school completion in Australia, Lamb et al. (2004) identified the important determinants as including: social and demographic factors (for example, gender, region, ethnicity, socioeconomic status, Indigenous status); curriculum and certification (for example, breadth of offerings, VET in Schools, senior school certificate requirements, alternative programs, university entry requirements); school organisation (for example, sector, selective entry schools, senior colleges, middle schools, TAFE<sup>1</sup>–school relations, TAFE requirements); student performance (for example, early school achievement and academic progress); teachers and pedagogy (for example, teacher quality, teaching styles, assessment); personal factors (for example, finances, physical and mental health, disability, psychological, pregnancy, drug use, transport, family obligations, family breakdown, homelessness); and economic and labour market phenomena (for example, employment and unemployment, apprenticeships, industry, recession and growth, teenage labour market opportunities). If anything, the most pronounced gap in completion is between Indigenous and non-Indigenous young people – a gap of the order of 40 percentage points (Long, Frigo & Batten 1998).

The set of determinants of school completion identified in the Australian literature is largely limited to information accessible through LSAY or its predecessors, which have served as the main data source for studies on the topic, including the independent studies by Le and Miller (2003, 2004); Marks and McMillan (2001); Ryan and Watson (2004); Vella (1999), as well as the series of LSAY reports, including Curtis and McMillan (2008); Fullarton et al. (2003); Jones (2002); Khoo and Ainley (2005); Lamb, Dwyer and Wyn (2000); Le and Miller (2002); Long et al. (1999); Marks and Fleming (1999); Marks et al. (2000); McMillan and Marks (2003); and Vickers, Lamb and Hinkley (2003).

One key dimension of this literature has been the relative importance of different aspects of socioeconomic status for school completion. Marks et al. (2000) argued that factors at the student, family, school or community levels that affect school outcomes can be broadly categorised into material (for example, ability, parents' income, class sizes, physical environment of community) and cultural (for example, own aspirations, parental attitudes to education, attitude of teachers and social capital). Marks et al. (2000) concluded that cultural factors, as measured by parents' education, had a stronger relationship to participation in Year 12 than wealth. In addition, they found that the importance of family education and occupation factors had declined for cohorts born more recently. In general, the studies using LSAY have commonly relied on measures of socioeconomic position such as occupational status and parents' education to investigate school completion and have not distinguished between cultural or resource explanations of the role of family background.

Some of the same studies that have analysed school completion using LSAY data have also analysed participation in higher education in Australia (Fullarton et al. 2003; Khoo & Ainley 2005; Lamb, Dwyer

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<sup>1</sup> TAFE = technical and further education.

& Wyn 2000; Long et al. 1999; Marks et al. 2000). Once again, the focus has often been on the shape of the socioeconomic status gradient and whether that has changed over time, particularly as the tuition fee regimes have changed over time (Chapman & Ryan 2005; Marks & McMillan 2006; Le & Miller 2005). One relatively widely held view is that family background factors tend to influence university participation via their effect on student achievement at the end of schooling, influencing effective eligibility of individuals to obtain a university place, rather than their ability to afford to undertake a university-level course (Cardak & Ryan 2006, 2009; James et al. 2007; Bradley et al. 2008).

A number of studies have explicitly studied the role of educational plans, aspirations or expectations on school completion or participation in post-school education and training using LSAY data. These studies include Marks, McMillan and Hillman (2001), Khoo and Ainley (2005), a series of studies by Marjoribanks (including Marjoribanks 2005a, 2005b), and Homel et al. (2012). Other studies have analysed career or occupational expectations and outcomes, such as Sikora and Saha (2011). Some of these studies have used structural equation models to analyse the direct and indirect impact of expectations on outcomes, although none has been explicit about how those separate effects are identified properly, the heart of the endogeneity issue referred to in the introduction.

In summary, the determinants of school completion and university participation have been widely studied in previous studies in different contexts, including in Australia. The measures of disadvantage considered in Australian studies have been limited to the standard measures available in the relevant data. Since many studies have relied on LSAY or its predecessors, the measures of disadvantage used have typically involved parental education and occupation-based socioeconomic status measures, and in some cases neighbourhood-based measures.

# Data and methodology

This section describes the key features of the data used in this study. First, it provides details on the sources and characteristics of the main datasets used in this study. Second, this section contains a description of some of the key patterns in the data. Finally, it sets out the approaches pursued in this paper to deal with methodological issues that might otherwise invalidate inferences from the estimated results.

## Data

LSAY is a program of surveys that trace the experiences of young people as they move from secondary school into the workforce and tertiary education and training. Information regarding school achievement, demographic background and other social activities and outcomes is collected. Respondents are first surveyed in the middle years of secondary schooling, and interviewed each following year for approximately ten years.

The Y03 LSAY survey used in this study commenced in 2003, in conjunction with the Organisation for Economic Co-operation and Development (OECD) Programme for International Student Assessment (PISA). A nationally representative sample of 12 551 15-year-old Australian school students was selected to participate in PISA. Of these, 10 370 became the LSAY Y03 cohort. This study uses data from students who remained in the Y03 study to 2008. Consequently, the main sample for analysis is restricted to the 6002 young people with complete information in that year. (See table 1 for details on the sample sizes.)

The Y06 LSAY cohort is similar, but commenced in 2006 as part of the 2006 PISA study. It involved a nationally representative sample of 14 170 15-year-old Australian school students selected to participate in PISA, all of whom became the LSAY Y06 cohort. This study uses data from students who remained in the study to 2009. Consequently, the main sample for analysis is restricted to the 5760 young people with complete information in that year. (See table 1 for details on the sample sizes.)

Features of the original PISA survey design and subsequent sample loss through attrition need to be taken into account in the analysis of the LSAY cohorts. The original survey designs involved samples stratified by state and school sector, but also involved the oversampling of Indigenous students,<sup>2</sup> so weights are provided with the PISA data to weight the achieved sample back to the population of 15-year-old Australian school students. Later drop-out from the sample (from 12 551 to 10 370 in 2003 for the Y03 cohort) and attrition from the sample after the initial survey years was greatest among those from more disadvantaged backgrounds and among low-achievement groups. Weights, somewhat similar to those developed in Rothman (2007) but closer to those described in Lim (2011), have been developed to deal with attrition from the two cohorts and are described in Homel et al. (2012). These weights are used to generate the descriptive statistics and the regression analysis conducted in this paper, such that the results are intended to reflect Year 12 completion and university participation patterns in the population. The weights also take account of the clustering of the data at the school level, and all standard errors in the paper are estimated to account for the complex nature of the survey design (in accordance with OECD 2005). Where variables reflecting reading and mathematical

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<sup>2</sup> The PISA procedures are described in OECD (2005), Thomson, Creswell and De Bortoli (2004) and Rothman (2007).

literacy are included in equations as explanatory variables, these are the first plausible values for these scales that appear in the data.

**Table 1 Sample sizes for LSAY Y03 and Y06 cohorts and sample sizes for analyses on Year 12 completion and university commencement**

	LSAY Y03	LSAY Y06
Full PISA sample in 2003, 2006	12 551	14 170
LSAY in 2003, 2006	10 370	14 170
Respondents for Year 12 completion	6 002	5 760
Respondents for university commencement	6 002	-

Source: LSAY Y03 and Y06 cohorts.

Since PISA is a study of 15-year-olds, Australian students captured in the survey come from a number of grades of school. The distributions of students across grades in the two samples are shown in table 2. Most students (around 70%) are in Year 10, with a further 20% in Year 11 and around 10% in Year 9. Small numbers of students were in Years 8 and 12. Obviously, the calendar years in which students complete Year 12 or might commence at university vary according to the year level students were in when first surveyed. The measure of completion of Year 12 used in this paper is based on whether individuals report they had received a Year 12 certificate from the relevant state certifying authority when surveyed.

In this study, completion of a Year 12 certificate is measured in any calendar year after the first year each grade cohort could have been in Year 12, given their starting level. University participation is measured in either of the first two years after each grade cohort would have been in Year 12. This allows us to count among the university participants those members of the cohorts who take a ‘gap’ year before commencing university. In this study we analyse data collected as part of the LSAY collections until 2009, inclusive. From table 2, this means we are in a position to analyse Year 12 completion effectively in both the Y03 and Y06 cohorts, as reflected in the lightly shaded cells. However, university commencement is only partially captured among the Y06 cohort (see the darkly shaded cells), so we limit our analysis of university participation to the Y03 cohort. Descriptive statistics for the data used are presented in table A1 in appendix A.

## Descriptive patterns

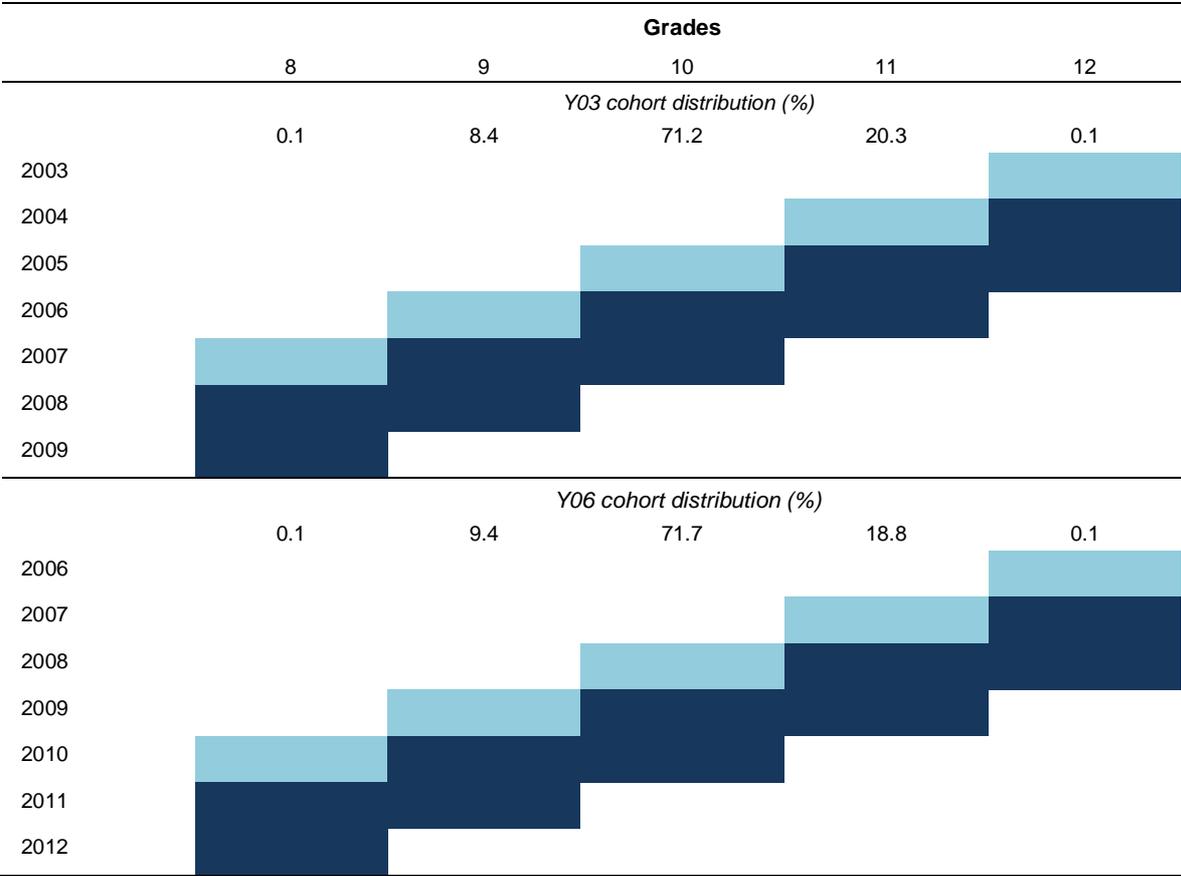
That aspirations are closely related to outcomes is apparent in table 3. It shows the proportions in the two LSAY cohorts who, when first surveyed, indicated that they intended to leave school after Year 12 and the proportion who hoped to study at university after school. In both cohorts, at least 85% indicated when aged 15 years that they intended to complete Year 12. Around one-half of respondents indicated that they intended to study at university.

## Year 12 plans and completion rates

From table 3, some three-quarters of those who indicated they intended to complete Year 12 received a Year 12 certificate from their state certifying authority, with another substantial group at least commencing Year 12. In contrast, only around a quarter of those who indicated they did not

intend to commence Year 12 in fact received a Year 12 certificate. Hence, plans to complete Year 12 are closely associated with actual completion.<sup>3</sup>

**Table 2 Distribution across grades when first surveyed (%) and resulting calendar year in which groups reach Year 12 or commence at university, LSAY Y03 and Y06**



Note: Light shading indicates calendar year Year 12 completion is measured, given year level when first surveyed in LSAY. Dark shading indicates calendar years university participation is measured, given year level when first surveyed in LSAY.

### University participation plans and realisations

Similar patterns are apparent in the Y03 cohort for university participation (see table 3). While a lower proportion of those who planned to attend university actually commenced university compared with those who received a Year 12 certificate and planned to undertake Year 12, participation rates were much higher than among the group who never intended to go to university. Close to 60% of those who planned to go to university did so, compared with less than 15% of those who did not intend to go.

### Methodology

The approach adopted to assessing the impact of the attainment plans of individuals on their educational outcomes is quite straightforward. It involves the use of multiple regression analysis of the outcome variable (or realisation) on a set of variables, including the plan/expectation/aspirations that an individual would complete that level of education. (See appendix B for further information on the variables.) The parameter on this plan/expectation/aspiration variable is the key parameter for this paper, although it uses mostly the same variables as those used to explain outcomes or realisations.

<sup>3</sup> Other research indicates that school completion rates in the LSAY Y03 cohort were higher than among the population of 18-year-olds in the 2006 census (see Homel et al. 2012).

**Table 3 Summary of plans and realisations, LSAY Y03 and Y06 (%)**

	LSAY Y03	LSAY Y06
<b>When first surveyed in LSAY</b>		
<i>Planned to leave school after Year 12</i>	91.7	85.2
Completed a Year 12 certificate	71.7	62.6
Participated in Year 12	13.4	17.3
Left before Year 12	6.6	5.3
<i>Planned to leave school before Year 12</i>	8.3	14.8
Completed a Year 12 certificate	1.2	4.1
Participated in Year 12	0.6	2.5
Left before Year 12	6.5	8.3
<b>When first surveyed in LSAY</b>		
<i>Planned to study at university after Year 12</i>	54.8	48.0
Commenced study at university	32.1	-
Not studying at university	22.7	-
<i>Did not plan to study at university</i>	45.2	52.0
Commenced study at university	6.0	-
Not studying at university	39.2	-

Source: LSAY Y03 and Y06 cohorts, weighted estimates. Includes respondents to 2008 for the Y03 cohort and to 2009 for the Y06 cohort.

## Will estimates of the aspirations parameter be reliable?

As foreshadowed, the main problem for the analysis is that educational plans may be endogenous in the equation explaining realisations, so their true effect will not be measured accurately. For example, because unobserved factors such as motivation may affect both educational aspirations and realisations, aspirations may be correlated with the error term in models where the dependent variables are actual educational outcomes. The consequence of this endogeneity will be to bias up the aspirations parameter, and bias down the parameters on the background variables. Therefore, we adopt four approaches to assess the potential bias in the aspirations parameter, all described in more detail below: simulation; instrumental variables; using regression approaches that allow for some unknown dependence structure between the errors of the aspirations and realisations equations; and the inclusion of additional variables likely to pick up some of the correlation between the errors.

First, we use simulated data to estimate how changes in the degree of correlation in the errors of aspirations and realisations might affect the estimated parameters on aspirations and family background variables. This analysis suggested that the potential biases could be quite large. This work is described in the next sub-section.

Second, we estimated the equation by instrumental variables, first using the plans of the students at the same school when they were first surveyed as an instrument for an individual's own plans. The equations were estimated for data principally from the Australian Capital Territory and Tasmania, where at least government school students must change schools to complete Year 12, given the structure of schooling in those states. The argument is that the plans of others at individuals' previous schools will only influence what the young people actually do via their aspirations and cannot have any direct impact on their later realisations. A second approach uses methods set out in Lewbel (2012), which do not rely on being able to exclude variables from the realisations equation that were included in the expectations equation. With this approach, the equation of interest can be estimated over the entire available sample.

Third, we allow for the correlation, or more generally dependence, between the errors of the aspirations and realisations equations (via a number of approaches, including bivariate probit), and in some instances, imposing differing degrees of correlation to see by how much the estimate on the aspirations variable changes in the realisations equation as the degree of assumed correlation changes. In addition to estimating the relationship via bivariate probit, we also estimate the relationship between aspirations and realisations, taking account of less specific forms of dependency between the errors of the two equations. We account for this dependency via two alternative *copula* functions, the Farlie-Gumbel-Morgenstern (FGM) and Frank copulas. (See Trivedi and Zimmer 2005 and Smith 2003 for discussion of the use of copulas.) Both the bivariate probit and the copula approaches involve estimating the two equations jointly, with additional parameters estimated to capture the nature of the correlation or dependence between the errors of the two equations. The bivariate probit approach imposes more structure on the nature of this relationship than is the case for the various copula estimators. The simulation exercise generally shows that these estimators have good properties, in that they produce estimates of the aspirations effect closer to the true parameter than other approaches.

Finally, we include variables likely to capture at least some of the correlation in the residuals in the regression equations. This involved including as additional regressors (in separate equations) that part of individuals' occupational plans for age 30 not explained by their social background, or achievement, and their hours of homework relative to their peers. We find that inclusion of these variables did not affect the magnitude of the aspirations parameter significantly.

### Simulations of the effect of regression mis-specification

To assess how wrong the regression estimates of the impact of aspirations on realisations might be in the presence of correlation, we adopt an approach whereby we artificially create data where we know their exact characteristics and apply the same regression approaches used here to see how well they perform with the artificial data.

The set-up with the data is as follows: individuals possess both continuous and discrete characteristics. Half are male, 5% are Indigenous and around 30% have another, unnamed characteristic. They possess an ability level, drawn from the normal distribution, and possess a family background socioeconomic status measure, drawn from a uniform distribution. These continuous measures are weakly positively correlated. The ability measure is negatively correlated with being male and being Indigenous, while socioeconomic status is positively correlated with the other characteristic and negatively correlated with being Indigenous. Individuals form aspirations about completing some level of education, based on all of their characteristics (via associated parameters for each characteristic that are set and common across the population) and a random factor. These factors are combined to provide individuals with some latent aspiration that they will complete the education level. The top 80% of individuals, in terms of their rank of this latent aspiration, are observed to indicate that they will complete this level of education. Individuals then realise this level of education, based on all of their characteristics, as well as their latent aspiration, and another random factor. These phenomena contribute to a latent realisation variable, again with set parameters fixed across the population. The top 70% of individuals, in terms of their rank of this latent realisation measure, are observed to actually complete this level of education. The random components of both the latent aspiration and realisation variables are positively correlated. A final variable exists in the data that is positively correlated with these two random variables.

These resulting generated data share many of the characteristics of the data we have to analyse here. It is just that in the generated data we know exactly how characteristics and random factors combine to determine the latent factors and the observed outcomes for individuals. In real data, we do not observe the latent factors or the random elements that influence decision-making, and therefore we do not know how closely they are related.

Here, we use the generated data, but make the same ‘mistakes’ we would if using real-world data. That is, we use the discrete aspirations and realisation outcome variables, we leave out the normally unobserved random factors from the realisation regression equation, and we ignore any potential positive correlation between the aspiration variable and the residual of that equation.

Our aim is to assess how wrong the parameter on the discrete aspirations variable is in the realisation equation. That is, we set the ‘true’ effect as part of the set-up to the simulation and then estimate it via standard regression approaches to see the extent to which the estimated effect departs from the real effect that was imposed on the data. We also assess how the error in the estimate behaves with differing degrees of correlation between the random elements of the aspiration and realisation variables. We analyse correlation levels of 0.1, 0.2 and 0.3 between the random elements, in conjunction with true effects sizes of aspirations on realisations of 0.2 and 0.4 (so, indicating you intend to complete the specified level of education increases your probability of doing so by 20 or 40 percentage points, respectively). We draw a dataset with 1000 observations and repeat the simulation exercise 100 times (constructing the data and estimating the parameters each time), and average the estimates over the 100 separate replications.

The results of this exercise are summarised in table 4. The first row shows the ordinary least squares (OLS) estimate of the parameter for the discrete aspiration variable (planned to complete or undertake the level of education) on the discrete realisation variable, for the two ‘true’ effect sizes for each of the three levels of correlation between the random elements of the two equations. The results suggest that, with even quite moderate levels of correlation (0.1, for example), the OLS estimates overstate the true effect considerably, by about one-half for the low true effect and a third for the higher true effect. The extent of the overestimate increases with the extent of the correlation in the two random errors of the two equations.

While not shown here, the estimates on the other variables included in the realisation equation (ability, socioeconomic status, gender, being Indigenous and the unnamed characteristic) are all biased towards zero in the various simulations, with the extent of the biases increasing with the effect size and the degree of correlation. The results in general confirm our concerns that the aspirations parameter is biased up and those of other effects biased down if there is any type of correlation between the unobserved factors that determine aspirations and realisations.

How much might the other strategies employed in this paper help us to obtain better estimates of the real impact of aspirations on realisations in the education domain? The remaining rows of table 4 are designed to help in an assessment of this issue.

The addition of a regressor that is correlated with the two random elements of the decisions reduces the bias in the aspirations parameter, but the effect is relatively modest, even with the degree of correlation with this additional regressor imposed here. This correlation was quite high, around 0.4, with both of the random factors. This suggests that any added variables will do relatively little to reduce the bias in the aspirations parameter unless their degree of association with the random elements is very high.

Attempting to account for the degree of potential correlation seems a more promising approach for obtaining parameter estimates on the aspirations variable that are closer to the true value. The FGM copula provides estimates that approach the true value as the extent of the correlation between the errors falls, while the Frank estimate is always lower than the true value, but approaches it as the extent of the correlation between the errors rises.

**Table 4 Simulated regression parameters: comparison of estimators in the presence of varying effect sizes and correlation levels**

	True effect: 0.2			True effect: 0.4		
	$\rho = 0.1$	$\rho = 0.2$	$\rho = 0.3$	$\rho = 0.1$	$\rho = 0.2$	$\rho = 0.3$
Base OLS estimate	0.312	0.381	0.452	0.540	0.596	0.652
	<i>(Ratio of true value)</i>					
Base OLS estimate	1.56	1.91	2.26	1.35	1.49	1.63
Additional correlated regressor	1.20	1.52	1.84	1.20	1.33	1.46
Farlie-Gumbel-Morgenstern (FGM) copula	1.03	1.33	1.62	1.01	1.11	1.23
Frank copula	0.50	0.70	0.91	0.56	0.63	0.70
Bivariate probit	1.06	0.98	1.12	0.94	1.01	1.05
Constrained bivariate probits						
For $\rho = 0.1$	1.23	1.35	1.94	1.20	1.35	1.50
For $\rho = 0.2$	0.89	1.18	1.60	1.04	1.18	1.33
For $\rho = 0.3$	0.55	1.00	1.25	0.86	1.00	1.15
For $\rho = 0.4$	0.21	0.82	0.88	0.67	0.82	0.97
For $\rho = 0.5$	-0.15	0.62	0.51	0.48	0.62	0.77

Note: OLS = ordinary least squares.

Regardless of the magnitude of the effect or the level of correlation between the random elements of the decision, the estimated parameter of the aspirations variable was centred on its true value when estimated via bivariate probit. While not shown in the table, the estimation approach also correctly estimates the degree of underlying correlation between the error terms or random elements of the two equations. This is encouraging, in that it suggests that allowing for such correlation, even when it is of an unknown magnitude, might help in estimating the true effect of aspirations on realisations. However, there are at least two grounds for caution. First, the standard errors associated with the estimated aspirations parameter were also high, as was that on the correlation parameter, indicating there was considerable variability in the estimated magnitude of the aspirations parameter across the replications and some difficulty for the bivariate probit estimator in determining the presence of the specified correlation level. Second, the draws of the random elements of the two decisions were from the bivariate normal distribution, so the bivariate probit model is correctly specified. Real-world departures from the bivariate normal distribution in the association between the two random elements would likely make this estimator less effective. Nevertheless, when a series of departures from the joint normality assumption was imposed on the data structure, the bivariate probit model always generated estimates of the aspirations parameter that were closer to the true value than the base OLS estimates, even in cases where the estimator wrongly detected only a small degree of correlation between the error terms. Nevertheless, it is difficult to generalise too much from the limited number of cases studied that involved departures from joint normality, even though some of the departures studied were quite extreme.

In the constrained bivariate probit estimation, the approach adopted simply imposes some level of correlation between the errors and estimates the parameters subject to that constraint. Not surprisingly, the closer the assumed correlation in the estimator is to that used in the construction of

the data, the closer the estimated parameter is to the true effect. In part, the information conveyed by this approach is how great the level of correlation would have to be to drive the estimated effect to zero. In most cases, the level of correlation would indeed have to be very high for the estimator to wrongly suggest the effect was really zero.

What are the lessons to be drawn from this analysis for estimation of the aspirations parameter from real-world data? First, the analysis confirms concerns about the potential for correlation between the unobserved elements influencing both aspirations and realisations to lead to an overestimation of the role of aspirations in determining realisations. The extent of the bias is considerable. The addition of variables correlated to these unobserved elements may reduce the bias, but the extent of the correlation needs to be very high. The results suggest that approaches that explicitly try to deal with potential correlation, such as the copula and the bivariate probit approaches, need to be employed to assess how reliable the magnitude of the estimates from the OLS approach really are.

# Results from the multivariate analysis

This section presents the results from the econometric analysis of the impact of educational aspirations on school completion and university participation. The school completion dependent variable takes the value 1 if the respondent obtained a Year 12 certificate and 0 otherwise for both the Y03 and Y06 cohorts. The university participation variable takes the value 1 if the individual was observed studying a bachelor's degree at university within two years of completing Year 12 for the Y03 cohort.<sup>4</sup> A broad range of demographic, family background, school and locality characteristics that may determine a young person's educational outcomes are also taken into account in estimating the impact of aspirations on outcomes. The results of least squares models are reported here, with the parameters showing how much the probability of Year 12 completion or university participation changes with a one-unit change in the relevant explanatory variables, while holding other explanatory variables constant. The discussion focuses first on the magnitude of the effects of aspirations on outcomes and moves on to the estimated role of other factors, including their potential interaction with aspirations.

## Magnitude of the aspiration effects

Aspirations have a large positive impact on educational outcomes. The estimated effects of planning to undertake Year 12 or study at university on actually completing Year 12 or studying at university are shown for the Y03 cohort in table 5 and on completing Year 12 only for the Y06 cohort in table 6. The tables show the estimated effects using a variety of estimation approaches, largely ones that mirror those used in the simulation results presented in the previous section. The estimated parameters of other explanatory variables for a sub-set of the estimation approaches are shown in appendix tables A2 to A5, and are discussed in more detail in the following sub-section.

The least squares estimate of the effect of planning to undertake Year 12 on the probability of actual completion in table 5 is 0.542 for the full Y03 cohort. Taken at face value, this suggests that, for two otherwise identical individuals, one who planned to undertake Year 12 would be 54 percentage points more likely to obtain a Year 12 certificate than one who did not plan to undertake Year 12. This is obviously an extremely large effect.

The least squares estimate among the smaller group used for the instrumental variables estimation (those whose high school did not have a Year 11 and 12 program) was smaller (0.225), but the instrumental variable estimates for that group were larger than the least squares estimates (0.397), suggesting that worrying about the endogeneity of aspirations for outcomes does not necessarily lead to smaller point estimates of their effect. For the Y03 cohort, the IV estimates are not significantly different from zero, but they are for Year 12 completion for the Y06 cohort. The IV estimation via the Lewbel (2012) approach over the entire sample provided qualitatively similar estimates, in that the parameter on the aspirations variable was no smaller than the effect of 54 percentage points on Year 12 completion provided by least squares.

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<sup>4</sup> Alternative dependent variables were also used: one where participation in Year 12 regardless of receipt of a certificate was used; the second was participation at university at any time after leaving school. Results using these variables were qualitatively similar to those presented in the paper.

As was the case for the simulation results, the addition of variables that might be correlated with both of the errors of the two equations does not influence the estimated parameter on aspirations significantly. The addition of either the unexplained part of the occupational plans of individuals at age 30 years or their hours of homework did not result in the parameter on aspirations falling below 50 percentage points.<sup>5</sup>

Taking account of the potential for some correlation between the unobserved factors that contribute to both aspirations and outcomes does have an impact on the magnitude of the estimated aspirations parameter. This is apparent for the effects estimated using either the FGM (0.321) or Frank (0.151) copula approach, as well as from the bivariate probit approach (0.466). Use of the FGM copula approach suggested that the degree of correlation between the unobserved parts of aspirations and outcomes was 0.20, while the correlation estimate from the bivariate probit approach was half that. The estimates from the constrained bivariate probit results, which impose differing levels of correlation between the unobserved parts of aspirations and outcomes, indicate that the extent of the correlation would need to be much higher than appears to be the case to drive the estimated effect to zero, being still positive and significant with a correlation of 0.5, as in table 5.

For the most part, the results for the various estimators of the effect of aspirations on university participation for Y03 and Year 12 completion for Y06 shown elsewhere in table 5 and in table 6 are qualitatively similar to those described for Year 12 completion for the Y03 cohort. The effects are large in magnitude, but the copula approaches, which allow for correlation between the unobserved parts of aspirations and outcomes, are smaller than when the possibility of any such correlation is ignored. (The FGM copula approach estimated correlations of around 0.1 in both cases.) Once more, the estimates from the constrained bivariate probit results indicate that the extent of the correlation would need to be much higher than appears to be the case to drive the estimated effect to zero, being still positive and significant with a correlation of 0.4 in these two cases. For these two sets of results, the bivariate probit estimated effects are slightly larger than the least squares estimates, with the estimator indicating that the correlation between the errors was negative, although not significantly different from zero.

## Which estimates should be preferred?

The copula estimates of the impact of aspirations on realisations appear to be the most reliable in this application. There are good reasons for anticipating that there might be some positive correlation between the unobserved parts of aspirations and outcomes. Estimators designed to take such correlation into account find evidence of its existence, which suggests results from these estimators will be the most reliable. We do not view those results as completely reliable since: a case can be made against our IV instrument;<sup>6</sup> the Lewbel (2012) approach remains relatively new and untested; and the bivariate probit model is fragile to departures from joint normality. Instead, our view is that the estimated magnitudes from the FGM and Frank copulas, in conjunction with information from the simulation exercise, provide the best evidence of the likely magnitude of aspirations on outcomes in these data.

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<sup>5</sup> Khoo and Ainley (2005) also include a variable that is likely to be highly correlated with the otherwise unexplained parts of educational aspirations and outcomes by including an 'attitudes to school' measure, but still their results point to extremely high aspirations effects.

<sup>6</sup> For example, one person with whom it was discussed suggested that average SES and aspirations of the original school attended by individuals would be closely correlated with those of their Year 11 and Year 12 school.

The FGM and Frank copula estimates were respectively 1.33 and 0.70 times the magnitude of the true effect, with a correlation of around 0.2 and a moderate effect size (see table 4). For the Year 12 effect for Y03 from table 5, this would coincide with an aspirations effect on Year 12 completion in the range of 20 to 25 percentage points. With a correlation of 0.1, the estimates for the Y06 cohort of the same effect both coincide with an effect of around 20 percentage points. Likewise, the estimate of the effect of intending to study at university on actually doing so appears to be of the order of 15 to 20 percentage points for the Y03 cohort.

While considerably smaller than the least squares estimates, these remain effects that are very substantial in magnitude. By way of comparison, the estimated effects of large changes in either school achievement or family background on educational outcomes are smaller. Moving an individual from the very bottom of the parental occupational socioeconomic status measure to the top of the distribution would increase their probability of completing Year 12 by around six percentage points from the Y03 results, while increasing both the maths and reading achievement of an individual by 100 points (the standard deviation of both scales is around 90) would increase that probability by 12 to 14 percentage points (see appendix table A5). The estimated university effects of these variables are similar, around six percentage points across the entire distribution of parental occupational socioeconomic status and around 15 percentage points for the combined maths and reading achievement effects.

**Table 5 Regression results Year 12 completion or university participation plans and realisations, LSAY Y03**

	Year 12 certificate		University participation	
	Plan effect	Std err.	Plan effect	Std err.
<b>2003</b>				
<i>Base results</i>				
OLS – whole sample	0.542***	0.034	0.268***	0.014
OLS – school movers	0.225	0.169	0.138***	0.021
IV – school movers	0.397	0.328	0.288	0.315
OLS – non-movers	0.579***	0.027	0.275***	0.014
<i>Inclusion of additional variables</i>				
OLS – occupational plans at age 30	0.518***	0.034	0.232***	0.015
OLS – homework hours relative to school average	0.538***	0.035	0.262***	0.014
<i>Effect of allowing for correlation between errors</i>				
Farlie-Gumbel-Morgenstern (FGM) copula	0.321***	0.019	0.157***	0.017
Frank copula	0.151***	0.023	0.113***	0.019
Bivariate probit	0.466***	0.135	0.428***	0.069
Constrained bivariate probit				
Effect of plan to leave complete education level				
For 'rho' = 0	0.532***	0.025	0.275***	0.012
For 'rho' = 0.1	0.459***	0.024	0.220***	0.012
For 'rho' = 0.2	0.383***	0.024	0.163***	0.012
For 'rho' = 0.3	0.304***	0.024	0.104***	0.011
For 'rho' = 0.4	0.221***	0.023	0.044***	0.011
For 'rho' = 0.5	0.134***	0.022	-0.018	0.011

Note: \* p<.10, \*\* p<.05, \*\*\* p<.01

Source: Estimated from LSAY Y03 data. Includes respondents to 2008 for the Y03 cohort.

**Table 6 Regression results Year 12 completion plans and realisations, LSAY Y06**

	Year 12 certificate	
	Plan effect	Std err.
<b>2006</b>		
<i>Base results</i>		
OLS – whole sample	0.393***	0.026
OLS – school movers	0.548***	0.076
IV – school movers	0.937***	0.237
OLS – non-movers	0.389***	0.027
<i>Inclusion of additional variables</i>		
OLS – occupational plans at age 30	0.380***	0.027
OLS – homework hours relative to school average	0.395***	0.026
<i>Effect of allowing for correlation between errors</i>		
Farlie-Gumbel-Morgenstern (FGM) copula	0.205***	0.022
Frank copula	0.097***	0.026
Bivariate probit	0.450***	0.086
Constrained bivariate probit		
<i>Effect of plan to leave complete education level</i>		
For 'rho' = 0	0.341***	0.022
For 'rho' = 0.1	0.271***	0.022
For 'rho' = 0.2	0.200***	0.021
For 'rho' = 0.3	0.126***	0.021
For 'rho' = 0.4	0.050***	0.020
For 'rho' = 0.5	-0.027	0.019

Note: \* p<.10, \*\* p<.05, \*\*\* p<.01

Source: Estimated from LSAY Y06 data. Includes respondents to 2009 for the Y06 cohort.

## Other effects on educational outcomes

One feature of the simulation results presented in the previous sub-section was that, while the least squares estimate of the aspirations effect on outcomes was biased upwards, the estimated effects of other factors were biased towards zero. (This is because these factors were also correlated with aspirations in the simulated data.) The same phenomenon appears to be in operation in the actual LSAY data (since many factors are correlated with aspirations in the LSAY data as well).

The full set of least squares estimates for Year 12 completion appear in appendix tables A2 for the Y03 cohort and A3 for the Y06 cohort, while the Y03 university participation results appear in table A4. The estimated effects using the FGM copula approach for these three sets of results are presented in appendix table A5 for comparison. Variables such as parental occupational socioeconomic status and parental education and the maths and reading achievement scores typically have higher parameters associated with their effect in the FMG estimates compared with the OLS estimates. In some cases, the estimated parameters are significantly different from zero in the FMG results, but not in the comparable OLS results (for example, the parental occupational socioeconomic status).

A second feature of note in the results is how many of the variables are individually significant in the outcome equation in both the FGM and OLS results. Unlike the results in Khoo and Ainley (2005) using earlier data, many factors appear to contribute to the educational outcomes in the LSAY Y03 and Y06 cohorts. Some variables are significant, even in the OLS results, while others are significant in the FGM results but not the OLS results. In general, the results are consistent with other earlier studies looking at educational outcomes: educational completion or participation increases with family

socioeconomic status (both parental education and occupation); is higher for females than males; is lower among the Indigenous population; is higher for households where both parents are present; and is higher among those who attended private schools. The difference in the educational participation of those who viewed their academic achievement as well above average by comparison with those who viewed themselves as below average was typically very large. In some cases, this difference in outcomes was similar to the estimated impact of the educational aspirations variable.

## Do aspirations interact with these other variables?

In general, we find that a number of the interactions are significant, although few of these are what would be considered ‘demographic’ factors. This issue was analysed by serially adding separate interaction terms between explanatory variables and the aspirations variable and assessing whether the interaction term was significantly different from zero. In a few cases, a number of related variables were interacted with the aspirations variable and a joint significance test was undertaken; for example, for the school sector effects and the school achievement relative to peers. The results of these various tests are summarised in table 7, which contains the estimated interaction effect and the p-value of the test.<sup>7</sup>

While there are cases where interactions were significant at the 5% level, in general, there appears to be no consistent interaction between aspirations and socioeconomic status or the background characteristics of individuals, including whether they were from an Indigenous background. There were, however, some significant effects relating to achievement, both as measured in the PISA data and school performance relative to peers. The achievement effects suggest that high-achieving individuals were more likely to realise their aspirations, while the relative performance measures suggest that those who considered their performance to be average or below average were less likely to realise their aspirations. The first element is not surprising in relation to higher education participation in the recent past in Australia, since we might well expect that the higher-achieving individuals at school were those most likely to earn high ATAR<sup>8</sup> scores and hence be offered places in a higher education system where places were limited.

In situations involving multiple tests, it is common to adjust the level of significance to avoid spuriously finding some significant differences. A common correction, named a Bonferroni correction, is to divide the nominal significance level by the number of tests being undertaken (in this case,  $0.05/12 = 0.004$ ). Other alternative approaches to such a correction involve slightly higher thresholds than the Bonferroni approach, although most would only treat as significant p-values below 0.005. That level of significance would result in just the two achievement and aspirations interactions for university participation in the Y03 cohort and the school performance relative to peers being significant in the table.

With the finding that the aspirations effect does not interact with those of the background characteristics, the question of whether high aspirations might compensate for the impact of being from a disadvantaged background on outcomes becomes less important. Since the effects seem additive, there can be no element of ‘compensation’. As noted in the previous sub-section, the aspirations effects dominate the background characteristics effects, even the large ones. But even with an aspiration to complete Year 12, those from low socioeconomic status or rural or single-parent households will still be less likely to realise their aspirations than other individuals.

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<sup>7</sup> P-values less than 0.05 indicate that the effect was significantly different from zero at the 5% level in the table.

<sup>8</sup> ATAR = Australian Tertiary Admission Rank.

In general then, it seems that the conclusion should be that aspirations tend to have a similar impact on outcomes, regardless of the background of individuals, with the exception of its interaction with real and relative academic performance. Hence, if it is possible through policy or the programs of schools or community organisations to change the aspirations of individuals, then such a change should translate in a common way across individuals, regardless of their demographic background, into increased educational outcomes.

**Table 7 Interaction effects between completion plans and other factors, LSAY Y03 and Y06**

	Year 12 certificate		University participation	
	Interaction effect	<i>p-value</i> <sup>(a)</sup>	Interaction effect	<i>p-value</i> <sup>(a)</sup>
<b>2003</b>				
Male	-0.083	0.105	0.002	0.944
Metropolitan	0.006	0.915	0.048	0.035
Indigenous Australian	-0.228	0.125	-0.127	0.029
Parent worked 2003	-0.088	0.142	-0.054	0.314
Both parents lived at home 2003	0.058	0.289	0.075	0.002
Parental occupation-based SES	0.001	0.485	0.001	0.067
Father has degree	-0.068	0.374	0.051	0.042
Mother has degree	0.028	0.569	-0.003	0.874
Reading achievement	-0.000	0.227	0.001	0.000
Maths achievement	-0.001	0.061	0.001	0.000
<i>Sector effects</i> <sup>(b)</sup>				
Independent school	-0.189	0.179	0.002	0.039
Catholic school	0.099		0.089	
<i>Performance relative to peers</i> <sup>(b)</sup>				
Above average at school	-0.248	0.001	-0.012	0.006
Average at school	-0.177		-0.092	
Below average at school	-0.386		-0.095	
<b>2006</b>				
Male	-0.031	0.560		
Metropolitan	0.108	0.048		
Indigenous Australian	-0.334	0.164		
Parent worked 2007	0.029	0.568		
Both parents lived at home 2007	0.021	0.707		
Parental occupation-based SES	0.000	0.709		
Father has degree	0.025	0.715		
Mother has degree	-0.039	0.544		
Reading achievement	0.001	0.153		
Maths achievement	0.000	0.371		
<i>Sector effects</i> <sup>(b)</sup>				
Independent school	0.012	0.853		
Catholic school	-0.031			
<i>Performance relative to peers</i> <sup>(b)</sup>				
Above average at school	0.018	0.479		
Average at school	-0.002			
Below average at school	-0.123			

Notes: a. P-values less than 0.05 indicate that the effect was significant at the 5% level.

b. Relevant test is a joint test that the parameters are jointly significantly different from zero.

# Summary and conclusions

This paper has studied the relationship between educational aspirations and their realisation. The results presented here confirm those of other studies: that aspirations have a substantial effect on educational outcomes. However, it appears that the method of analysis also matters. Once you allow for the possibility that the unobserved components of aspirations and their realisation may be correlated, then the real effect of aspirations on outcomes appears to be around one-half of that measured by approaches that ignore any such correlation.

The data studied here, from the Y03 and Y06 cohorts of the Longitudinal Surveys of Australian Youth, indicate an aspirations effect on Year 12 completion in the range 20 to 25 percentage points; they also indicate the effect of intending to study at university on actually doing so of the order of 15 to 20 percentage points. These are large effects, much larger than the effects of school achievement or family background on these outcomes.

In general, then, it seems that these aspirations tend to have a similar impact on outcomes, regardless of the demographic background of individuals. That is, interaction effects between aspirations and the demographic characteristics do not seem particularly important. It is possible that there are significant interactions between aspirations and real and relative academic performance, which suggests that high-achieving individuals are more likely to realise their aspirations. Furthermore, those who considered their performance to be average or below average were less likely to realise their aspirations than those who considered their performance to be well above average. The results suggest that, if it is possible through policy or the programs of schools or community organisations to change the aspirations of individuals, then such a change should translate equally across individuals, in terms of their demographic characteristics, into increased educational outcomes. Interventions, for example, that increase the educational aspirations of Indigenous youth or other young people from low socioeconomic status backgrounds, might have the same impact on their outcomes as those changing the aspirations of those from other parts of the social welfare distribution.

This study does not focus explicitly on how aspirations are determined or how effective alternative policies or the programs of schools or community organisations might be in changing the aspirations of individuals. Potential interventions range from providing information on the returns from alternative levels of completed education or on the educational pathways that lead to particular careers, to improving the experience of schooling for young people and providing financial support for extracurricular activities. The process of realising aspirations could also be addressed by improving the achievement levels of individuals, as well as by removing the barriers that prevent aspirations being realised. Changes to the operation of higher education in Australia that allow it to expand will presumably act to reduce the achievement-related aspiration interactions for university participation found here. Essentially though, this study pushes the emphasis back onto the processes that shape the aspirations of young people; it found that these do determine what young people go on to do, and translate into outcomes in a similar way across individuals, regardless of their social background.

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# Appendix A: Tables

**Table A1 Descriptive statistics**

	Y03		Y06	
	Mean	Std dev.	Mean	Std dev.
Plan to leave school after Year 12	0.917	0.276	0.852	0.355
Year 12 certificate	0.729	0.444	0.662	0.473
Plan to study at university	0.562	0.496	0.491	0.500
University participation	0.362	0.481	0.306	0.461
Male	0.509	0.500	0.506	0.500
Metropolitan	0.675	0.469	0.630	0.483
Indigenous Australian	0.015	0.121	0.027	0.161
Siblings	1.9	1.1	(a)	(a)
Parent worked 2003, 2006	0.933	0.251	0.755	0.430
Both parents lived at home 2003, 2006	0.726	0.446	0.788	0.409
Parental occupation-based SES	39.9	23.9	41.2	24.0
Father has degree	0.402	0.490	0.330	0.470
Mother has degree	0.398	0.490	0.311	0.463
Independent school	0.166	0.372	0.162	0.369
Catholic school	0.226	0.418	0.221	0.415
ACT	0.019	0.136	0.019	0.136
Vic.	0.242	0.428	0.230	0.421
Qld	0.193	0.395	0.210	0.407
SA	0.089	0.285	0.083	0.275
WA	0.116	0.320	0.111	0.314
Tas.	0.021	0.144	0.019	0.137
NT	0.007	0.084	0.008	0.090
Above average at school	0.410	0.492	0.361	0.480
Average at school	0.418	0.493	0.423	0.494
Below average at school	0.016	0.127	0.042	0.201
Reading achievement	535.6	93.0	520.0	89.6
Maths achievement	534.0	93.3	524.7	85.6
Job at 30 residual	-0.003	0.783	0.005	0.840
Hours of weekly homework	5.9	4.8	5.8	4.0
Number of observations	6002		5760	

Note: (a) Sibling data not collected in the initial LSAY Y06 survey.

Source: LSAY Y03 and Y06 cohorts. Includes respondents to 2008 for the Y03 cohort and to 2009 for the Y06 cohort.

**Table A2 Year 12 certificate regression results: LSAY Y03 cohort**

	OLS – all observations		OLS – forced moves		IV – forced moves	
	Coefficient	Std error	Coefficient	Std error	Coefficient	Std error
Plan to leave school after Year 12	0.542***	(0.034)	0.225	(0.169)	0.397	(0.328)
Male	-0.030**	(0.012)	0.033	(0.048)	0.028	(0.046)
Metropolitan	0.063***	(0.014)	0.048	(0.035)	0.049	(0.036)
Indigenous Australian	0.005	(0.043)	-0.033	(0.076)	-0.020	(0.075)
Siblings	-0.000	(0.005)	0.013	(0.017)	0.015	(0.019)
Parent worked 2003	-0.010	(0.026)	-0.110	(0.077)	-0.110	(0.076)
Both parents lived at home 2003	0.047***	(0.016)	-0.055*	(0.029)	-0.067*	(0.035)
Parental occupation-based SES	0.000	(0.03)	-0.126	(0.106)	-0.145	(0.113)
Father has degree	-0.000	(0.015)	0.077	(0.074)	0.104	(0.101)
Mother has degree	0.013	(0.012)	-0.033	(0.05)	-0.048	(0.061)
Independent school	0.046**	(0.021)				
Catholic school	0.045***	(0.01)	0.089***	(0.026)	0.086***	(0.025)
ACT	-0.040*	(0.022)	-0.009	(0.047)	-0.022	(0.054)
Vic.	0.021	(0.019)				
Qld	0.051***	(0.018)				
SA	-0.058*	(0.033)				
WA	-0.085***	(0.022)				
Tas.	-0.042	(0.027)				
NT	-0.067*	(0.035)				
Above average at school	-0.021*	(0.012)	0.003	(0.042)	0.012	(0.047)
Average at school	-0.075***	(0.015)	0.044	(0.066)	0.052	(0.068)
Below average at school	-0.232***	(0.061)	-0.641***	(0.102)	-0.529**	(0.201)
Reading achievement	0.039***	(0.011)	0.129**	(0.051)	0.113**	(0.053)
Maths achievement	0.005***	(0.012)	0.097	(0.095)	0.099	(0.097)
Constant	-0.162***	(0.062)	-0.515**	(0.228)	-0.601**	(0.295)
R2	0.309		0.318		0.304	
Number of observations	6002		753		753	

Notes: Standard errors in brackets.

\* p&lt;.10 \*\* p&lt;.05 \*\*\* p&lt;.01

Source: LSAY Y03 cohort.

**Table A3 Year 12 certificate regression results: LSAY Y06 cohort**

	OLS – all observations		OLS – forced moves		IV – forced moves	
	Coefficient	Std error	Coefficient	Std error	Coefficient	Std error
Plan to leave school after Year 12	0.393***	(0.026)	0.548***	(0.076)	0.937***	(0.237)
Male	-0.066***	(0.017)	-0.061	(0.047)	-0.014	(0.047)
Metropolitan	0.050***	(0.016)	0.186***	(0.063)	0.204***	(0.061)
Indigenous Australian	0.093	(0.1)	0.011	(0.095)	0.024	(0.092)
Parent worked 2003	0.015	(0.023)	0.081	(0.054)	0.078	(0.052)
Both parents lived at home 2003	0.062**	(0.026)	-0.092	(0.06)	-0.092	(0.062)
Parental occupation-based SES	0.000	(0.03)	-0.089	(0.118)	-0.033	(0.142)
Father has degree	0.024	(0.019)	0.003	(0.061)	-0.038	(0.065)
Mother has degree	-0.011	(0.016)	0.020	(0.039)	0.023	(0.043)
Independent school	0.001	(0.024)	-0.027	(0.07)	0.016	(0.118)
Catholic school	0.059***	(0.018)	0.069	(0.068)	0.039	(0.054)
ACT	-0.001	(0.03)	-0.022	(0.066)	-0.083	(0.073)
Vic.	-0.011	(0.025)				
Qld	0.117***	(0.016)				
SA	0.016	(0.022)				
WA	-0.011	(0.034)				
Tas.	-0.217***	(0.025)				
NT	-0.058	(0.039)				
Above average at school	0.018	(0.018)	-0.022	(0.043)	-0.011	(0.04)
Average at school	-0.019	(0.021)	-0.023	(0.049)	0.019	(0.049)
Below average at school	-0.148***	(0.041)	-0.460***	(0.122)	-0.382**	(0.175)
Reading achievement	0.054***	(0.017)	0.101**	(0.043)	0.030	(0.058)
Maths achievement	0.047***	(0.018)	-0.015	(0.051)	-0.008	(0.056)
Constant	-0.225***	(0.071)	-0.274*	(0.145)	-0.302	(0.189)
R2	0.259		0.401		0.319	
Number of observations	5760		639		639	

Notes: Standard errors in brackets.

\* p&lt;.10 \*\* p&lt;.05 \*\*\* p&lt;.01

Source: LSAY Y03 cohort.

**Table A4 University participation regression results: LSAY Y03 cohort**

	OLS – all observations		OLS – forced moves		IV – forced moves	
	Coefficient	Std error	Coefficient	Std error	Coefficient	Std error
Plan to leave school after Year 12	0.266***	(0.034)	0.138***	(0.021)	0.288	(0.315)
Male	-0.097***	(0.012)	-0.105**	(0.041)	-0.081	(0.076)
Metropolitan	0.037***	(0.014)	-0.018	(0.033)	-0.009	(0.048)
Indigenous Australian	-0.013	(0.043)	0.039	(0.059)	0.024	(0.056)
Siblings	-0.017***	(0.005)	0.015	(0.012)	0.015	(0.011)
Parent worked 2003	-0.089***	(0.026)	-0.035	(0.085)	-0.038	(0.091)
Both parents lived at home 2003	0.045***	(0.016)	-0.045	(0.053)	-0.048	(0.058)
Parental occupation-based SES	0.000	(0.03)	0.424***	(0.102)	0.402***	(0.105)
Father has degree	0.080***	(0.015)	-0.056	(0.034)	-0.057*	(0.034)
Mother has degree	0.041***	(0.012)	0.084**	(0.04)	0.078*	(0.046)
Independent school	0.106***	(0.021)				
Catholic school	0.054***	(0.01)	0.075**	(0.035)	0.052	(0.071)
ACT	-0.080***	(0.022)	-0.124***	(0.042)	-0.140**	(0.064)
Vic.	0.017	(0.019)				
Qld	-0.006	(0.018)				
SA	-0.009	(0.033)				
WA	0.008	(0.022)				
Tas.	0.018	(0.027)				
NT	0.015	(0.035)				
Above average at school	-0.068***	(0.012)	-0.026	(0.045)	-0.002	(0.066)
Average at school	-0.182***	(0.015)	-0.125**	(0.053)	-0.086	(0.099)
Below average at school	-0.226***	(0.061)	-0.251***	(0.094)	-0.228*	(0.133)
Reading achievement	0.000**	(0.011)	0.080***	(0.024)	0.077**	(0.032)
Maths achievement	0.001***	(0.012)	0.080**	(0.034)	0.058	(0.06)
Constant	-0.383***	(0.062)	-0.562***	(0.205)	-0.529***	(0.2)
R2	0.379		0.395		0.374	
Number of observations	6002		753		753	

Notes: Standard errors in brackets.

\* p&lt;.10 \*\* p&lt;.05 \*\*\* p&lt;.01

Source: LSAY Y06 cohort.

**Table A5 FGM copula regression results**

	Y03 Year 12 completion		Y06 Year 12 completion		Y03 University participation	
	Coefficient	Std error	Coefficient	Std error	Coefficient	Std error
Plan to leave school after Year 12	0.321***	(0.019)	0.205***	(0.022)	0.157***	(0.017)
Male	-0.025***	(0.009)	-0.058***	(0.012)	-0.069***	(0.009)
Metropolitan	0.053***	(0.01)	0.048***	(0.012)	0.042***	(0.01)
Indigenous Australian	-0.052**	(0.02)	-0.018	(0.026)	-0.019	(0.02)
Siblings	-0.005	(0.004)			-0.014***	(0.004)
Parent worked 2003	-0.008	(0.018)	0.005	(0.019)	-0.051***	(0.018)
Both parents lived at home 2003	0.068***	(0.01)	0.062***	(0.02)	0.064***	(0.01)
Parental occupation-based SES	0.055***	(0.021)	0.019	(0.026)	0.064***	(0.021)
Father has degree	0.005	(0.01)	0.036***	(0.014)	0.067***	(0.01)
Mother has degree	0.023**	(0.01)	-0.005	(0.013)	0.049***	(0.009)
Independent school	0.027**	(0.013)	0.014	(0.014)	0.105***	(0.013)
Catholic school	0.03***	(0.011)	0.072***	(0.013)	0.044***	(0.011)
ACT	-0.034*	(0.019)	-0.007	(0.021)	-0.067***	(0.018)
Vic.	0.046***	(0.013)	0.011	(0.017)	0.035***	(0.013)
Qld	0.083***	(0.014)	0.113***	(0.016)	0.003	(0.014)
SA	-0.052***	(0.016)	0.001	(0.018)	-0.007	(0.016)
WA	-0.06***	(0.014)	-0.027	(0.018)	-0.005	(0.014)
Tas.	-0.042**	(0.02)	-0.154***	(0.023)	0.015	(0.02)
NT	-0.061**	(0.024)	-0.039	(0.032)	-0.001	(0.024)
Above average at school	-0.021	(0.013)	0.009	(0.014)	-0.068***	(0.013)
Average at school	-0.083***	(0.013)	-0.049***	(0.015)	-0.167***	(0.013)
Below average at school	-0.294***	(0.035)	-0.132***	(0.033)	-0.228***	(0.035)
Reading achievement	0.054***	(0.008)	0.066***	(0.012)	0.046***	(0.008)
Maths achievement	0.062***	(0.008)	0.073***	(0.012)	0.111***	(0.008)
Constant	-0.262***	(0.04)	-0.342***	(0.046)	-0.53***	(0.039)
Number of observations	6002		5762		6002	

Notes: Standard errors in brackets.

\* p&lt;.10 \*\* p&lt;.05 \*\*\* p&lt;.01

Source: Y03 &amp; Y06 cohorts.

# Appendix B: Data description

This study relies on two main sources to analyse how Year 12 completion is related to disadvantage: the 2003 and 2006 cohorts of the Longitudinal Surveys of Australian Youth (LSAY). This appendix provides details on the data used.

## Variable definition

A detailed description of variables used in the analysis of Year 12 completion and university participation is provided below. The dependent variables, Year 12 completion (and university participation) are defined to equal to 1 if the respondents report having a Year 12 certificate (participate in university).

**Table B1 Variables used in the analysis of Year 12 completion and university**

Variable name	Description	Measurement period
Plans to leave school after Year 12	= 1 if student plans to go on to Year 12, = 0 if not	respondent age 15
Year 12 certificate	= 1 if respondent indicated they had received a Year 12 certificate from their jurisdiction's certifying authority, = 0 if not	respondent's last school in year
Plans to go to university	= 1 if student plans to go to university, = 0 if otherwise	respondent age 15
University participation	= 1 if student was at university in either of first two years after they undertook Year 12, = 0 if otherwise	one or two years after respondent's last year in school
Gender	= 1 if male, = 0 if female	respondent age 15
Metropolitan	= 1 if living in capital city of an Australia jurisdiction, = 0 otherwise	respondent age 15
Indigenous Australian	= 1 if Aboriginal or Torres Strait Islander, = 0 otherwise	respondent age 15
Number of siblings	number of siblings (4 = 4 or more in LSAY)	respondent age 15
Parent worked 2003, 2006	= 1 if parent employed full-time or part-time, = 0 if not employed.	respondent age 15
Both parents lived at home 2003, 2006	= 1 if both parents live in household, = 0 if single parent household	respondent age 15
Parental occupation-based SES	Occupational status of the responding parent of the youth measured by the ANU4 scale (Jones & McMillan 2001)	respondent age 15
Father (mother) has a degree	= 1 if father (mother) has bachelor degree or higher, = 0 if less	respondent age 15
School sector	Three dummy variables indicating students enrolled in (1) government (base group), (2) Catholic, (3) Independent schools	respondent's last school year
Residential state	Dummies for the state of residence of the respondent. NSW (base), Vic., Qld, SA, WA, Tas., NT	respondent age 15
Self-assessed school performance	Four dummy variables indicating students who are doing (1) well above average (base), (2) better than average, (3) average, and (4) below average.	respondent age 15
Achievement		
Reading literacy	See below for both scales. 1st plausible value in the data for both scales is used.	respondent age 15
Mathematical literacy		
Aspirations		
Job at 30 residual	Residual from regression of respondents ANU4-scaled expected job at age 30 (Jones & McMillan 2001) on the same set of Xs used in regressions reported in table A3, for example	respondent age 15
Hours of weekly homework	Hours of weekly homework reported by respondents relative to (divided by) the average among other students at the same school	respondent age 15

## Mathematical literacy and reading literacy

The PISA survey assesses the mathematical literacy and reading literacy of 15-year-olds, which represents broad maths and reading concepts and skills. The emphasis is not so much on testing knowledge of specific aspects taught in the school curricula, but on mastery of processes, the understanding of concepts and the ability to function in various real-world situations within each domain. Such abilities are considered necessary to enable students to apply maths and reading skills in adult life (OECD 2003).

Scores on these scales are reported as plausible values. These are a set of random variables (five for each scale) selected for each student at random from an estimated ability distribution of students with similar item-response patterns and backgrounds. Plausible values are used because the goal of the PISA assessment is to provide good estimates of the parameters of student populations, rather than estimates of individual student performance.

### Mathematical literacy

Mathematical literacy includes students' ability to 'analyse, reason, and communicate ideas effectively as they pose, formulate, solve, and interpret solutions to mathematical problems in a variety of situations' (OECD 2003, p.15). It includes assessments of:

- mathematical content (quantity, space and shape, change and relationships, uncertainty)
- process (for example, the use of mathematical language, modelling and problem-solving skills)
- situations in which maths is used (including personal, educational, occupational, public and scientific).

### Reading literacy

Reading literacy includes students' ability to 'understand, use and reflect on written text to achieve their purposes' (OECD 2003, p.16). This includes an 'active' element – a capacity to reflect upon written text, as well as merely comprehend it. The reading items include assessments of:

- text format, including different prose forms (for example, narration, argumentation) and various non-continuous texts (for example, graphs, application forms, advertisements)
- reading process, referring to students' ability to retrieve information, understand and interpret the text, and reflect upon its content, form and features
- the situation for which the text was constructed (for example, a novel or letter for personal use, official documents for public use, textbooks or worksheets for educational use).





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